Spectral Convergence of Symmetrized Graph Laplacian on Manifolds with Boundary

J. Wilson Peoples
The Pennsylvania State University , USA
jwp5828@psu.edu

We study the spectral convergence of a symmetric, truncated graph Laplacian matrix induced by a Gaussian kernel evaluated on pairs of data, sampled from a manifold with boundary. Specifically, we deduce convergence rates for eigenpairs of this matrix to the eigensolutions of the Laplace-Beltrami operator satisfying homogeneous Dirichlet boundary conditions. We provide a detailed numerical investigation of this convergence on simple manifolds. Our method of proof combines a min-max argument over a compact and symmetric integral operator with a recent weak convergence result coming from an asymptotic expansion of a Gaussian kernel integral operator on a manifold with boundary.

Joint work with John Harlim (The Pennsylvania State University).